

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
ROTORCRAFT DIRECTORATE
SOUTHWEST REGION
FT. WORTH, TEXAS 76193

In the matter of the petition of *

Helicopter Association International *

Regulatory Docket No. 004SW

for an exemption from *

§ 6.488 of the Civil Air Regulations *

GRANT OF EXEMPTION

By letter dated October 10, 1990, Mr. Frank L. Jensen, Jr., President, Helicopter Association International (HAI), 1619 Duke Street, Alexandria, Virginia 22314-3439, petitioned the Federal Aviation Administration (FAA) for an exemption from § 6.488 of the Civil Air Regulations (CAR) Part 6 which requires an engine compartment fire extinguisher for certain Sikorsky Aircraft Model S-58 series helicopters that are equipped with a single reciprocating engine larger than 1500 cubic inches displacement.

The petition was submitted in behalf of all operators of the helicopters whether or not they are members of the HAI. The proposed exemption would permit operation of these helicopters with a standard airworthiness certificate rather than a restricted category airworthiness certificate without having an engine compartment fire extinguisher system installed that complies with § 6.488.

The petitioner requests relief from the following regulation:

Section 6.488 of CAR Part 6 adopted by Amendment 6-4 effective May 16, 1953; (18FR2218, April 18, 1953) requires an engine compartment fire extinguisher system on all rotorcraft having a (reciprocating) engine of more than 1500 cu. in. displacement. The airworthiness standard further specifies design standards for the extinguisher systems.

The petitioner's supportive information follows:

Background

The Sikorsky Aircraft Model S-58 helicopter was first flown in 1954, primarily as a military design helicopter. In the same year, however, Sikorsky Aircraft applied to the Civil Aeronautics Administration for the type certification of a civil version and on August 2, 1956, Type Certificate No. 1H11 was issued for the Models S-58A, B and C. All of these configurations were powered by the Wright Cyclone (1820 cubic inches displacement) reciprocating engine. Over 2,000 of these helicopters were produced by Sikorsky Aircraft alone but the preponderance were in a military configuration, such as the Model H-34 series. Sikorsky Aircraft factory delivery of civil S-58 models essentially ceased in 1959. In 1981 Sikorsky Aircraft licensed California Helicopter Parts, Inc. (now known as California Helicopter International) to produce S-58 and S-58T (turbine powered) series helicopter replacement parts and to provide other support activities for the fleet of helicopters. Sikorsky Aircraft continues to be the type certificate holder.

Type Certificate No. 1H11 was issued on the basis of Part 6 of the Civil Air Regulations dated January 15, 1951, plus Amendments No. 6-1 through 6-6, which were the airworthiness standards in effect. Amendment No. 6-4, effective May 16, 1953, introduced the new fire protection airworthiness standards for civil rotorcraft.

In about 1966, Sikorsky Aircraft initiated a program for the conversion of military surplus H-34, etc. versions to the FAA type certificated S-58 series configurations. This program involved an inspection by Sikorsky Aircraft personnel of the candidate aircraft (for the purpose of determining the closest FAA-approved configuration) and the subsequent supply to the helicopter owner of the FAA-approved data for that civil Model S-58 configuration. In this manner a converter could make the necessary modifications to the military model in order that a particular aircraft would conform to an FAA-approved S-58 Type Design. A local FAA airworthiness inspector would verify proper conformity and issue a standard airworthiness certificate as a particular S-58 Model. Some 130 aircraft were inspected, data provided, converted, and released to civil service. All of these conversions and conformities were accomplished by organizations other than Sikorsky Aircraft after the initial inspection and support by Sikorsky personnel. The original plan called for the FAA inspector of the modification to notify the FAA controlling region of the issuance of the "Standard" Airworthiness Certificate. Type Certificate Data Sheet No. 1H11 was amended after proper notification to list the serial number of that aircraft as a specific Model S-58 helicopter.

The petitioner believes a military surplus S-58 (military Model H-34) helicopter was first issued a Restricted Category Airworthiness Certificate in 1977 under a Restricted Category Type Certificate which was issued under the provisions of § 21.25(a)(2) of Part 21 of the Federal Aviation Regulations. Since these certificates were issued only on the basis of the military design and operating experience, no type design data was produced for these (H-34 series) helicopters. Thus, these aircraft, being in the Restricted Category, are not awarded by the FAA the same operational privileges as those converted under the program discussed in the preceding paragraph; i.e., operations under a "Standard" Airworthiness Certificate.

The presence of civil S-58 helicopters certificated by one of three different programs (i.e., those originally built by Sikorsky Aircraft as civil aircraft and conformed to the FAA-approved type design at the factory, those converted from a military configuration to an S-58 that conforms to the approved type design, and those certificated directly from military surplus as a military H-34 helicopter in the Restricted Category) has caused some degree of confusion in the field. The petitioner notes the differences are hardly discernable from a casual external examination and believes that, for this reason, some of the aircraft in the second category listed above (military to FAA civil configuration) may be without the required engine compartment fire extinguishing system.

When such discrepancies were noted in 1989, the FAA issued Airworthiness Directive No. 89-25-01, which requires installation of an operating engine compartment fire extinguisher no later than November 30, 1990, in all S-58 helicopters operating under a "Standard" Airworthiness Certificate. This AD has resulted in significant consternation among certain of the S-58 operators. Parts conforming to the FAA-approved 30 year old type design are not available. In some cases the need for an operable and conforming engine compartment fire detector system (also identified in the AD) became a collateral problem. To alleviate the problems of parts availability, the FAA issued approvals for "Alternate means of compliance" with the fire detector requirement by limiting the altitude of operation and requiring engine compartment inspections prior to the first flight of each day until a fire detector system was operable.

The HAI notes the S-58 helicopters being operated today in the civil fleet of the U.S. are engaged almost exclusively in industrial aerial work (e.g. carrying external loads for construction projects, firefighting, etc.) and are owned and/or operated by relatively small businesses. With Sikorsky Aircraft no longer producing replacement parts, these operations are supported primarily by California Helicopter International, the licensee, and are affected by the availability of military H-34, etc. parts that also conform to the S-58 series type design data.

PETITIONERS VIEWPOINT

The efforts of the S-58 operators and California Helicopter International to produce the presently required (CAR 6.488) fire extinguishing systems have met with continuing frustrations, both economic and practical. All parts for a kit conforming to the S-58 Type Design are not available. Even if the parts were available, the cost (parts, labor, helicopter down-time, lost revenues, etc.) is unbearable to the small operator. It has been estimated that the cost per aircraft for the installation of such a kit (assuming that the conforming parts could be found) would be between \$10,000 and \$20,000. If it is necessary to first produce a Supplemental Type Certificate (STC) for an alternate but complying installation, the cost could escalate to \$50,000 or more per aircraft.

It is realized that economics do not override safety concerns, but the operators and the HAI question the safety need for such compliance based on their personal experience with this aircraft in civil operation. The FAA noted in the preamble to AD 89-25-01 only one incident of an in-flight engine fire in an S-58 helicopter in civil operations. Thus, for decades "Standard" S-58's converted from H-34's, and Restricted Category H-34's have been operating without a demonstrated need for this extinguishing system.

The fact that most of the present-day S-58 operations are conducted at relatively low altitudes (i.e., less than 2,000 feet above ground level (AGL) and without passengers although approved for 14 or fewer passengers), provides additional evidence that an engine compartment fire extinguisher is not needed for the S-58 to meet the objectives originally established by Amendment 6-4 to CAR Part 6. The preamble to that Amendment identifies a series of regulatory sections of Part 6 whose general intent "is to provide protection from power-plant fires to a degree which will assure that a controlled autorotational landing can be made during a period of at least 5 minutes after the start of an engine fire". (Ironically, § 6.488 is not listed among that series, perhaps because for that purpose the engine fire is envisaged as being a high-altitude, enroute event.) Command Helicopters (an S-58 operator in Joliet, Illinois) recently conducted a series of autorotational descents and submitted the following results to AD Docket file No. 89-ASW-33:

<u>From</u>	<u>Time to Touchdown</u>
500' Above ground level (AGL)	14.38 seconds
1000' AGL	28.86 seconds
1500' AGL	49.91 seconds

The petitioner concludes that for most S-58 civil operations the 5 minutes of protection provided by the S-58 series designs is more than adequate to permit a safe landing and evacuation.

The petitioner perceives a feeling among some S-58 pilots that, in the event of an engine fire, they would elect not to use the engine fire extinguisher (if installed) so that they could avoid any chance that the fire extinguisher agent would smother the engine and remove from them the use of engine power during landing.

The petitioner believes the service history of the S-58 helicopter has proven that an engine compartment fire extinguisher is not necessary for safety, particularly in its present-day operational mode as noted. When Amendment 6-4 was promulgated, no civil experience existed for helicopters in the Model S-58 weight class. The reasons for selecting an engine size of 1500 cubic inches as a criterion for the requirement of engine compartment fire extinguishers is not immediately available. No compatible criterion can be found in the comparable fixed-wing requirements of either CAR Parts 3 or 4a. At the time, it may have appeared reasonable, but the civil operating experience of the S-58 helicopters (some 33 years with only one in-flight engine fire) raises the question as to whether such equipment is necessary.

Since the FAA Administrator is obligated to enact special requirements when adverse service experience indicates the need, the HAI contends that he is also obligated to act when positive service experience reflects the lack of a need for the application of a specific criterion. In the light of the factors presented, the petitioner believes the Administrator should execute his prerogatives under the provisions of § 21.17(a)(1)(i) and exempt the Model S-58 series design from compliance with § 6.488 of CAR Part 6.

The HAI petitions the FAA to exempt the Sikorsky S-58 series design from compliance with § 6.488 on the basis of the operating experience accumulated on the S-58 fleet.

Granting the exemption would permit the public to continue to safely enjoy the benefits of the presence of these small operators and their use of the Model S-58 helicopters in performing external-load operations in competition with the newer turbine-powered helicopters. Not granting the exemption would create a severe economic burden upon the affected small-business type of operator which is unwarranted when viewed in the light of the S-58 series helicopters operating experience of 33 years as argued by the petitioner.

The petitioner contends that an exemption from § 6.488 is appropriate rather than rescinding AD 89-25-01, which prescribes compliance with that standard.

A summary of the petition was published in the Federal Register on November 6, 1990 (55FR46761). No comments were received.

The Federal Aviation Administration's (FAA) analysis of the petition follows:

As the petitioner notes Amendment 6-4 to CAR Part 6 effective May 16, 1953, in part adopted new and amended fire protection standards for all sizes of rotorcraft. These changes would provide greater protection in the event of an engine compartment fire. The objective of the rulemaking is stated in a note following Section 6.480, General, of Amdt. 6-4;

"The powerplant fire protection provisions should protect the passengers and crew for at least 5 minutes after start of an engine fire and permit a controlled autorotation landing within this time period."

A previously adopted standard required flammable fluid line shut-off valves that could be closed and opened when needed in flight. Nevertheless in Amdt. 6-4 the FAA anticipated a prompt landing of the helicopter after recognition of an engine compartment fire. The petitioner deduced this objective. The autorotation rates of descent submitted for AD docket file No. 89-ASW-33 are evidence that the lapsed time for descent from typical operating altitudes above ground level is significantly less than 5 minutes. The safety record of the standard S-58 helicopter design and the H-43 restricted category helicopter design, which was cited by the petitioner is an important factor along with other factors considered in this analysis.

The CAR Part 6 standards used for the S-58 require quick acting fire detectors for helicopters with engines of more than 900 cu. in. displacement and a fire extinguisher for those helicopters with engines of more than 1500 cu. in. displacement. The current airworthiness standards for normal category helicopters (FAR Part 27) require quick acting fire detectors but no engine compartment fire extinguisher. Many of the larger normal category helicopters in production or service today, such as the Agusta A109A series, Bell 206L series, and Aerospatiale Alouette III series helicopters, which are approved for 8, 7 and 7 occupants respectively (1 flight crew and 6 or 7 passengers), do not have a fire extinguisher.

For those S-58 series helicopters with reciprocating engines but without a fire extinguisher, a level of safety equivalent to present normal category helicopters would be achieved by limiting those S-58 helicopters to a 7 occupant configuration. That is, 5 passengers would be permitted in the passenger compartment if a fire extinguisher is not installed.

For those operators of S-58 helicopters with reciprocating engines and standard airworthiness certificates desiring to carry more than 5 passengers in the cabin, an engine compartment fire extinguisher, installed in accordance with § 6.488 of Amdt. 6-4, is still required.

In consideration of the foregoing, I find that a grant of the exemption requested is in the public interest and would not adversely affect safety. Therefore, pursuant to the authority of §§ 313(a) and 601(c) of the Federal Aviation Act of 1958, delegated to me by the Administrator (14 CFR 11.53), the HAI and all operators of Sikorsky Model S-58A, B, C, D, E, F, G, H, and J helicopters are granted an exemption from compliance with the requirements of § 6.488 of Amendment 6-4 (18FR2218, April 18, 1953) to Part 6 of the Civil Air Regulations; subject to the following conditions and limitations:

1. Flight operations are limited to no more than 7 occupants, with no more than 5 occupants in the passenger cabin.

2. A durable placard, decal, or marking must be installed in full view of the pilot and legible to the pilot in daylight conditions that reads as follows:

"Engine Fire Extinguisher Not Installed; Five (5) or fewer occupants permitted in the passenger compartment."

This exemption also relieves persons from compliance with paragraph (c) of AD 89-25-01, Amdt. 39-6401 (54FR48582, November 24, 1989) when the above conditions and limitations are met.

This exemption remains effective indefinitely unless rescinded or superseded.

Issued in Fort Worth, Texas on February 26, 1991.

**Original Signed By:
James D. Erickson**

James D. Erickson
Manager, Rotorcraft Directorate,
Aircraft Certification Service